

# NASA TECH BRIEF



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## Calibratable Solid-State Pressure Switch

### The problem:

Development of a very accurate pressure switch having precise set points and minimal hysteresis characteristics. This switch was used in conjunction with solenoid valving in control of a source of gaseous pressure. The specified environmental temperatures ranged from  $-100^{\circ}$  to  $+165^{\circ}\text{F}$ , with levels of vibrations as high as 50g. Dual output elements were required, each with a nominal set point of  $20.5\text{ lb/inch}^2$  (differential). Set points were to be individually adjustable in the field within  $1\text{ lb/inch}^2$ , with a dead band (pressure differential between actuation and deactuation of the switch) of from 0.15 to  $0.50\text{ lb/inch}^2$  under environmental conditions. The permissible time lag for actuation or deactuation was 10 msec. Ability to calibrate the switch was to be an independent function. It had to be powered by direct current.

### The solution:

A switch that contains a single output element rather than dual elements; it measures roughly 5 by 3 by 3 inches. Separate diaphragms are used for calibration and sensing of the system pressure. The switch incorporates a semiconductor light-detector (the aperture being varied by pressure) coupled to an electrically controlled actuating unit. The actuator

consists of a piston, a flexure-supported Belleville spring, and the pressure-controlling diaphragm.

The new switch is novel in that it provides accurate and reliable switching over a broad range of pressures and environments. It may interest specialized manufacturers, such as processors of ultrapure materials in inert atmospheres, or designers of environmental chambers.

### Notes:

1. More-sensitive optical systems, such as fiber optics, may improve the switch's performance.
2. Documentation is available from:

Clearinghouse for Federal Scientific  
and Technical Information  
Springfield, Virginia 22151  
Price \$3.00  
Reference: TSP69-10437

### Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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